



## **Nebraska On-Farm Research: Precision Nitrogen Management Project** **Nitrogen Fertilizer Inhibitors for Enhanced Nitrogen Use Efficiency in Corn**

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### **Objective**

The objective of this on-farm trial is to evaluate the effect of fertilizer nitrogen stabilizers (nitrification inhibitors, urease inhibitors) on nitrogen use efficiency (kg grain/kg fertilizer N), nitrogen loss, vegetative growth N stress, crop yield, and profits. Nitrogen Inhibitors would be applied in fall, and/or spring and/or compared with split N application without inhibitors.

### **Why Participate?**

Recent wet years in Nebraska has renewed producer's interest in protecting fertilizer nitrogen loss from volatilization, denitrification, and leaching. Participation in this trial will allow you to evaluate the effect of nitrogen inhibitors in enhancing nitrogen efficiency and crop yield on your farm. You will work closely with Nebraska Extension to accomplish the project. In addition, this study provides you the opportunity in improving nitrogen management and protecting groundwater resources in Nebraska.

All eligible cooperating producers will receive \$600 per study in recognition of their time and resource commitments and \$700 per study to mitigate risk of potential yield (and therefore potential profit) loss.

All eligible cooperating producers can receive up to \$1200 for reimbursing allowable study expenses, such as purchasing fertilizer nitrogen additives.

### **Study Details**

**Layout:** A randomized complete block design with 4 replications are needed for this trial (Figure 1). Rows planted in each treatment need to be equal to or greater than corn head width. The same hybrid and management practices should be used across the entire study area.

**Treatments:** Any of the following treatments can be selected to compare nitrogen application with and without nitrogen inhibitors. See possible scenarios in Figure 1.

- A: Fall nitrogen without Inhibitor
- B: Fall nitrogen with Inhibitor
- C: Spring nitrogen without Inhibitor
- D: Spring nitrogen with Inhibitor
- E: Split nitrogen without inhibitor

Depending on farmer's fertilizer type, urease or nitrification inhibitors could be used in any of the following or other possible combinations.

**Nitrification inhibitors option:** Urea with Instinct/nitrapyrin, UAN with Instinct/nitrapyrin or DCD, Anhydrous ammonia with N-Serve/nitrapyrin, Ammonium nitrate with nitrapyrin/DCD.

**Urease inhibitors option:** Urea with Agrotain Ultra/NBPT or Agrotain or Agrotain Plus, Urea with Limus/NBPT/NPPT, UAN with Agrotain Ultra/NBPT or Agrotain or Agrotain Plus, UAN with Limus/NBPT/NPPT

**Possible treatment comparison scenarios**

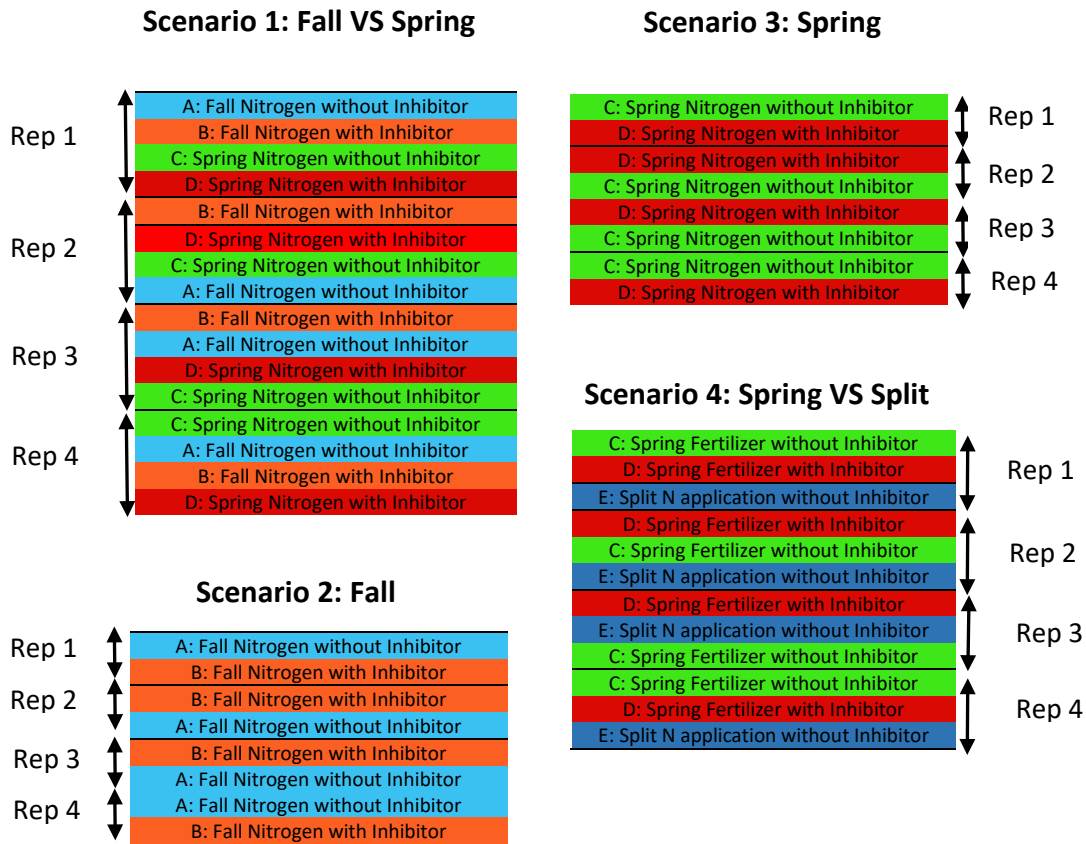


Figure 1. Possible scenarios for comparing nitrogen application with and without inhibitors

**Data collection:**

The UNL team will work to collection soil samples, stand counts, imagery, rainfall, and soil moisture data on the field sites. Grower will need to provide the yield monitor data and previous variable rate N fertilizer maps.

- Routine soil sampling at 0-8” depth. Soil samples will be collected prior to N application in Fall or spring.
- Early season stand counts.
- Vegetative growth N stress at V10-V12.
- Aerial NDVI imagery during the growing season to observe visual crop canopy differences.
- Sample soil at 0-12” for nitrate and ammonium analysis on the following sampling dates.

Sampling times	Fall Application	Spring Application	Split Application
1	November-after fertilization	-	-
2	March (pre-plant)	March or April – after fertilization	March-April after fertilization
3	2 weeks later	2 weeks later	2 weeks later
4	2 weeks later	2 weeks later	2 weeks later
5	2 weeks later	2 weeks later	2 weeks later
6	2 weeks later	2 weeks later	2 weeks later

- Yield monitor data for study year and previous crops.
- Variable rate fertilizer N map for previous year, if any.
- Site rainfall and soil moisture data.

## Grower Requirements

### *Site Selection:*

- Poorly drained or well aerated soil
- No previous cover crop
- No manure applications in last 5 years
- Corn-soy or corn-corn rotation
- Will plant 1 hybrid in field
- Follow same management practices for all treatments

### *Are you willing to:*

- Flag or mark GPS location of each treatment.
- Provide all necessary inputs for crop production
- Complete background agronomic form about site and practices e.g. soil type as defined by USDA, previous tillage conditions, hybrid planted, tillage system, residue type, and planting depth etc.
- Collect yield data with a **well calibrated** yield monitor. (Contact UNL Extension if assistance with this process is needed.)
- Submit harvest data to UNL Extension within 30 days of harvest or by Dec. 15.
- Allow UNL Extension to use submitted and collected data for research, educational, and informational purposes.
- Willing to work closely with the UNL researchers to set up treatments in field length strips (Dr. Iqbal, Laura Thompson, local educator).

**Study Questionnaire (to help us plan the best study scenario):**

- What nitrogen fertilizer application method do you use at your farm? \_\_\_\_\_
- Which nitrogen fertilizer and inhibitor are you interested in using (see above or provide other options)? \_\_\_\_\_
- Do you have capability of applying inhibitors with nitrogen fertilizer? \_\_\_\_\_
- Do you have in-season N capabilities or willing to hire in-season N application \_\_\_\_\_
- Irrigated or non-irrigated? \_\_\_\_\_
- Farm/field location? \_\_\_\_\_
- Describe you current N management plan \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Field history (was there a study conducted on this field in the past 5 years? Manure use? Variable management? Broadcast, incorporated, or banded fertilizer?) please describe.  
\_\_\_\_\_

**Because this study is sponsored by USDA-NRCS, all participants will need to complete an eligibility check. Please respond to the following two questions to help the NRCS begin the assessment.**

1. Are you currently a participant in USDA Farm Programs?  YES  NO
2. Have you ever had, or do you currently have, an EQIP or CSP contract with NRCS?  YES  NO

Name \_\_\_\_\_

Address \_\_\_\_\_

County \_\_\_\_\_

Farm number (if known) \_\_\_\_\_

Tract number of field to be used for the study (if known) \_\_\_\_\_

If Farm and Tract number are unknown, please share GPS location of the field \_\_\_\_\_

**Disclaimer:** The Nebraska On-Farm Research Network does not endorse the use of products tested in on-farm replicated strip trials. While treatments are replicated within trials and may be replicated across multiple sites under various conditions, your individual results may vary.

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